UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|---|---|---|---|---|
| 09/752,637 | 12/29/2000 | Gerard J. Foschini | 12-6 | 1484 |

22046 7590 10/13/2004

LUCENT TECHNOLOGIES INC.
DOCKET ADMINISTRATOR
101 CRAWFORDS CORNER ROAD - ROOM 3J-219
HOLMDEL, NJ 07733

| EXAMINER | |
|---|---|
| BOCURE, TESFALDET | |
| **ART UNIT** | **PAPER NUMBER** |
| 2631 | |

DATE MAILED: 10/13/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

| Office Action Summary | Application No. | Applicant(s) | |
|---|---|---|---|
| | 09/752,637 | FOSCHINI ET AL. | |
| | Examiner | Art Unit | |
| | Tesfaldet Bocure | 2631 | |

*-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --*

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

1)☐ Responsive to communication(s) filed on *20 December 2000*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

4)☒ Claim(s) *1-60* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☒ Claim(s) *42-60* is/are allowed.

6)☒ Claim(s) *1,3-7,9,10,13-22,25 and 26-41* is/are rejected.

7)☒ Claim(s) *2,8,11,12,23 and 24* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

**Application Papers**

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *05/22/04*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

## DETAILED ACTION

### *Information Disclosure Statement*

1. The Examiner has considered the Information Disclosure Statement received on 12/20/00 and the initialed copy (one copy) of the 1449 is attached with this correspondence.

### *Claim Rejections - 35 USC § 102*

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

3. Claims 1,3-7,9,10,13-18,20-22, 25-30-33,34,37,40 and 41 are rejected under 35 U.S.C. 102(b) as being anticipated by Calderbank et al. (WO00/14921).

4. Calderbank et al. (Calderbank hereinafter) teaches a space-time diversity transmission system having a transmitter (see for transmitters in figures 1 and 2) and a receiver (receiver 20 in fig. 1) comprising: the transmitter having a time-space coder signal (42) for coding the encoded source signal into a linear combination of the source by conjugating and inverting the sign of the source data C1 and C2 (see coding elements 42 and 52); grouping the time-space coded signal into matrix (see for the matrix in elements 42 and 52); and encoding (see channel encoder 41 and 51) before space-time encoding as in 1,9,10,16,18 and 25.

Further to claims 3-7,13-15,17,20-22,26,27,29-30 Calderbank also teaches that: The time-space encoder signals are derived from source coded signals C1 and C2 as in claim 3; the division of the source signals are further divided as shown in figure 2 to correspond to the number of antenna elements 44,45,54,55 as in claims 4,6,7,14,15,21,22 and 30; encoded source signal into a linear combination of the source by conjugating and inverting the sign of the source data C1 and C2 (see coding elements 42 and 52) as in claims 5,13,20 and 29; and transmitting the diversity signal using an RF signal, inherent in the transmission of signals using antenna, as in claims 17 and 27.

Further to claims 31-33,34,37,40 and 41 Calderbank also teaches that: the received signals are reconstructed by the decoder 26 and the reconstructed signals are further decoded and sampled by the decoder (28) for driving the transmitted signal as in claim 31-35,37 and 41; and the decoder 28 uses a mean square error detection as in claim 40 (see page 11, lines 19-24).

***Claim Rejections - 35 USC § 103***

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

6. Claim 26 rejected under 35 U.S.C. 103(a) as being unpatentable over Calderbank et al. (WO00/14921).

Calderbank et al. (Calderbank hereinafter) teaches a space-time diversity transmission system having a transmitter (see for transmitters in figures 1 and 2) and a receiver (receiver 20 in fig. 1) comprising: the transmitter having a time-space coder signal (42) for coding the encoded source signal into a linear combination of the source by conjugating and inverting the sign of the source data C1 and C2 (see coding elements 42 and 52); grouping the time-space coded signal into matrix (see for the matrix in elements 42 and 52); and encoding (see channel encoder (41 and 51) before space-time encoding as in claim 25.

Further Calderbank also teaches that the space-time signal having a 2X2 metrics derived from two source codes C1 and C2. However he fail to teach that the 4x4 matrix as claimed in claim 26. Such a 4x4 matrix derived from four source codes is a matter of design choice, wherein if the system of Calderbank is about to transmit four symbols in each antenna, it would have been a combination of four symbols, C1, C2, C3 and C4 having a conjugate and a negative sign of each of the symbols as in claim 26. Therefore, it would have been obvious to one of an ordinary skill in the art to generate a 4x4 matrix having a combination of the uncoded symbols and their conjugate and negative sign to be transmitted at the time the invention was made.

### *Claim Rejections - 35 USC § 103*

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the

invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

8. Claims 19,36, 38 and 39 are rejected under 35 U.S.C. 103(a) as being unpatentable over Calderbank et al. (WO00/14921) in view of Dabak et al. (US patent 6,775,260).

9. Calderbank et al. (Calderbank hereinafter) teaches a space-time diversity transmission system having a transmitter (see for transmitters in figures 1 and 2) and a receiver (receiver 20 in fig. 1) comprising: the transmitter having a time-space coder signal (42) for coding the encoded source signal into a linear combination of the source by conjugating and inverting the sign of the source data C1 and C2 (see coding elements 42 and 52); grouping the time-space coded signal into matrix (see for the matrix in elements 42 and 52); and encoding (see channel encoder (41 and 51) before space-time encoding as in claims 16 and 31.

What Calderbank fails to teach is that:

the space-time encoded signals are spreaded as in claim 19; and

the received signal at the receiver are despreaded, match filtered and decorrelated as in claims 36, 38 and 39 respectively

Dabak for the same endeavor as the instant application and that of Calderbank teaches a transmission system (figs 2, 6A,7) having a transmitter and receiver, wherein the transmitter for transmitting a space-time encoder diversity signal having means for spreading the encoded signal (see element 208 in fig.2). The receiver comprising a matched filter for dispreading and decorrelating the received signal (600-604) the received spread spectrum signals as in claims 19,36, 38 and 39.

Therefore, it would have been obvious to one of an ordinary skill in the art to apply a spread spectrum transmission method in the system of Calderbank in order to transmit the space-time encoded and spreaded signal for a secure transmission at the time the invention was made.

### *Allowable Subject Matter*

10. Claims 42-60 are allowed.

11. Claims 2,8,11,12,23 and 24 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

### *Reasons for Allowance*

**12.** The following is a statement of reasons for the indication of allowable subject matter: The claimed subject matter in claims 42-60 is allowable because the arts of record fail to teach the claimed "42. Apparatus for use in processing received signals that were transmitted via four transmit elements of a transmitter, said transmitter being adapted to transmit a source bit stream by dividing said source bit stream into L data sub streams, L > 2 and grouping derivatives of symbols derived from each of said data substreams to form four transmit time sequences, one sequence for each transmit element, each of said time sequences spanning f symbol periods, at least one of said derivatives of said symbols being a complex conjugate of one of said symbols, said apparatus comprising: ***a matrix multiplier (207 in fig.2) for supplying as an output***

***matched filtered signals which are versions of preprocessed signals derived from a received signal which includes versions of said time sequences which have been combined by the channel between said transmit elements and said receiver*** **; and a baseband signal processing unit (209) receiving said matched filtered signals as an input and developing therefrom reconstructed versions of said symbols derived from each of said data substreams.**

13. The subject matter in claims 2,8,11,12,23 and 24 are allowable because the arts of record fail to teach the claimed matrix for transmission in each antenna.

***Conclusion***

14. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. US patent numbers and application 2002/0154705, 2002/0106008, 65,94,473 and 6,661,856 issued to Walton et al., Guey, and Dabak et al. and Calderbank et al., respectively disclose a transmission system for transmitting and receiver a space-time encoded signals.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Tesfaldet Bocure whose telephone number is (571) 272-3015. The examiner can normally be reached on Mon-Thur (7:30a-5:00p) & Mon.-Fri (7:30a-5:00p).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mohammad H Ghayour can be reached on (571) 272-3021. The fax phone

number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Tesfaldet Bocure
Primary Examiner
Art Unit 2631

T.Bocure